TELEDYNE TAPTONE
Package Inspection Systems
A Teledyne Technologies Company

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TapTone APPLICATION NOTES

News and information from Teledyne TapTone, a leader in the package inspection industry.

HOW TO DETERMINE IF A CONTAINER CAN BE INSPECTED WITH THE T4000 DUAL SENSOR COMPRESSION SYSTEM

PART 2
CAPS & CLOSURES

Tested: Various Plastic Containers
Inspection Desired: Leak Inspection
Tested with: T4000-Dual Sensor Compression

The purpose of this series of application notes is to explain how to determine if a container is suitable for inspection with a TapTone T4000-DSC.

The application note will be divided into three parts;

Part 1 – Container Design - See Application Note Volume 4, No 3, Part 1
Part 2 – Caps & Closures
Part 3 – Fill Level and Contents

A bottle of household chemicals passes through a TapTone 4000-DSC.

TECHNOLOGY CORNER *How it works*

The T4000-Dual Sensor Compression system finds and rejects leaking and damaged flexible bottles at production line speeds up to 300 feet per minute. The system is designed with dual parallel belts suspended over the customers' existing conveying system.

As the container passes through the system, the dual parallel belts apply force to the sidewall of the container. This action compresses the headspace of the container which allows a comparative measurement to be taken at both the infeed and the discharge of the system. Comparing the container to itself between the infeed and discharge of the system, eliminates typical variations seen in the production environment (Fill Level, Product Temperature, and Container Density).

Utilizing advanced DSP technology the T4000 controller analyzes the comparative measurement and assigns a merit value to each container. If the merit value is outside of the acceptable range, a reject signal activates a remote reject system.

T4000 Dual Sensor Compression (DSC) System. Sensor has a cantilever design that suspends over the existing conveyor.

Caps and Closures

It should first be stated that all closures can leak. There is no closure system that is leak proof. Some closures and sealing methods may produce a more consistent result than others but all have the potential to produce a leaking container. The more common types of caps found on a flexible plastic containers include;

Screw Cap (Ropp)

Screw Caps are one of the most common cap types used on plastic containers. The caps can act as the primary seal or they can include a film or foil seal inside the cap that is applied in the induction sealing process.

Snap Cap

The snap cap can often be seen on fresh milk products. The snap cap will include a tamper ring that needs to be removed to allow the cap to snap on or off the container. The snap cap can have threads that will screw down over a threaded neck or be pushed over the treads. This type of cap is referred to as a snap/screw cap.

Pump or Spray

Pump and spray caps are most often found on chemical containers. These closures will have a threaded cap that screws down onto the neck of the bottle. Typically, the pump or spray mechanism has no affect on the inspection.

Film And Foil Seals

If a container does not have a cap it will use a seal as a closure. The most common types of seals include;

Foil Seal

The foil seal is often found in the dairy industry on containers that are packaged to provide an extended shelf life or on containers that are aseptically filled. Foil seals are also common on food containers including yogurt, coffee or condiments such as mayonnaise.

Film Seal

The film seal is often used in applications where it is desirable to be able to see the product through the seal such as fruit cups and some dairy applications like cottage cheese.

Capping Technology

There are a multitude a sealing and capping technologies. Like the seals and caps themselves, some technologies produce a more reliable seal than others. The capper can be a screw on, press/push, roll on, automatic, semi-automatic, rotary or inline. The T4000-DSC inspection is not effected by the capper technology. The only requirement is the cap be secure enough to allow pressure to build up in the head space of the container without popping the cap off the bottle.

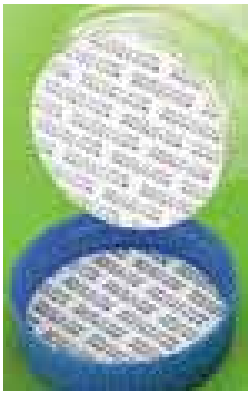
Sealing Technology

The two primary sealing technologies used on plastic containers are Induction Seals and Conduction Seals. Both technologies use a combination of pressure and heat to apply the seal. The downward pressure holds the seal to the container while the heat source bonds the seal to the container. Both technologies can create leaks if the heating source malfunctions. It is possible to overheat the foil causing damage to the seal layer and to any protective barriers. Over heating may also damage the sealing surface of the container. The absence of the foil seal or a defective sealing surface on the container are also common sources of sealing defects.

Note: *The type of sealing technology does make a difference when inspecting for leaks.*

Conduction Seals

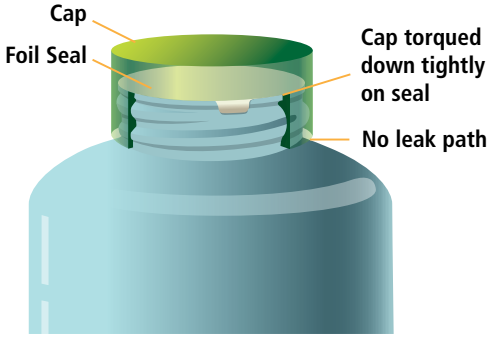
A conduction seal is typically a foil seal that is applied to a plastic container using a conduction sealing head. Heat is transferred through the heated element to the metal conduction head. When the head is in contact with the container topped with aluminum foil, the combination of pressure and heat causes the foil to be hermetically sealed to the container. Conduction seals are usually done before the over-cap is applied to the container. The foil seal is the primary seal. The T4000-DSC should be located after the conduction sealer and before the over cap is applied.



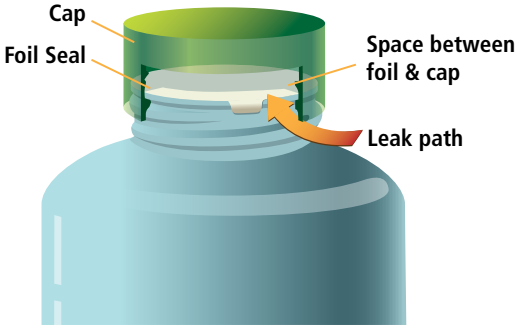
Induction Seals

An induction seal is typically a film or foil seal that is inside a cap before the cap is applied to the container. Like a conduction seal, the induction seal requires a heat source to bond the seal to the bottle. Unlike the conduction seal there is no sealing head applying downward pressure to the seal. The induction seal gets that downward pressure from the overcap which is torqued down on the container. The container then passes through a tunnel where heat bonds the seal to the land of the bottle. If the cap is securely torqued to the container, the container will not leak while it is on the production line. This condition prevents the T4000-DSC from detecting a faulty primary film or foil seal.

NOTE: *Closures that include a foil seal and plastic over cap must have the over cap removed or de-torqued enough to allow air from the head space to freely escape the bottle when a leak is introduced in the foil seal. TapTone can not guarantee test results unless this condition is met.*



Bottle with cap tightly closed (fully torqued)



Bottle with cap loosened (de-torqued)

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